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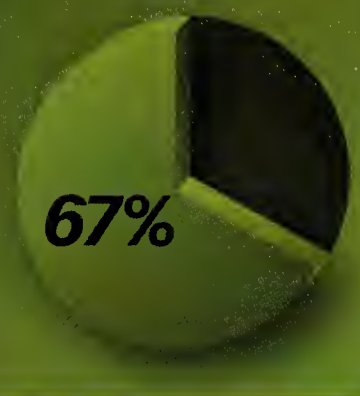
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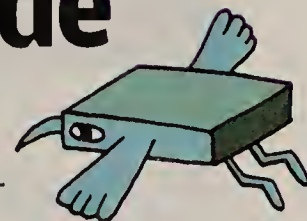
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Heads Up



IT CAREERS

50% of H-1Bs Went to Outsourcers in 2013

THE U.S. has begun accepting H-1B visa applications for the federal government's next fiscal year, and demand is likely to be heavy. Most of the visas are expected to go to IT services providers that use visa holders to displace U.S. workers.

The U.S. makes 65,000 H-1B visas available annually under its base cap, with an additional 20,000 set aside for foreigners who earned advanced degrees at U.S. universities. On April 1 each year, the government starts accepting visa petitions for the fiscal year that begins Oct. 1.

Data from the U.S. Citizenship and Immigration Services shows that offshore outsourcers were the largest users of H-1B visas in the government's 2013 fiscal year.

The IT services providers among the top 20 H-1B users took a little more than 50% of the 65,000 visas available under the base cap.

(That figure is for initial visas approved in the 2013 fiscal year, not renewals.)

The two largest H-1B users — Infosys, with 6,298 visas, and Tata Consultancy Services, with 6,258 — are both based in India. In third place is Cognizant, which is based in New Jersey but runs large offshore centers. These companies regularly appear at the top of the list of H-1B users.

In a statement, Cognizant said that it's "committed to attracting and retaining the top talent in the United States and around the world." The company added that it has hired 7,000 U.S. workers recruited locally over the past two years and is committed to hiring at least 10,000 more locally over the next three years.

— Patrick Thibodeau and Sharon Machlis

SOFTWARE

Oracle No. 2 in Software Sales, Passing IBM in '13

Oracle has overtaken IBM as the world's second-largest software vendor, pulling in \$29.6 billion in software revenue during 2013, according to Gartner.

"Global trends around big data and analytics with business investment in database and cloud-based applications helped to drive Oracle's top-line growth," Gartner analyst Chad Eschinger said in a statement.

Microsoft stayed in first place, at \$65.7 billion in software sales, while IBM moved down to third with \$29.1 billion. SAP remained in fourth place, at \$18.5 billion, Gartner said.

Symantec, EMC, Hewlett-Packard, VMware, CA Technologies and Salesforce.com rounded out the top 10.

Global spending on software increased around 5% overall last year to \$407.3 billion, with developed countries making up for "relative sluggishness" in emerging market areas, according to Gartner.

Software as a service has had a major impact on both buying habits and spending totals, according to Gartner. Salesforce.com's appearance in 10th place marked the first time a pure SaaS vendor cracked the top 10.

The SaaS subscription pricing model enables customers to invest

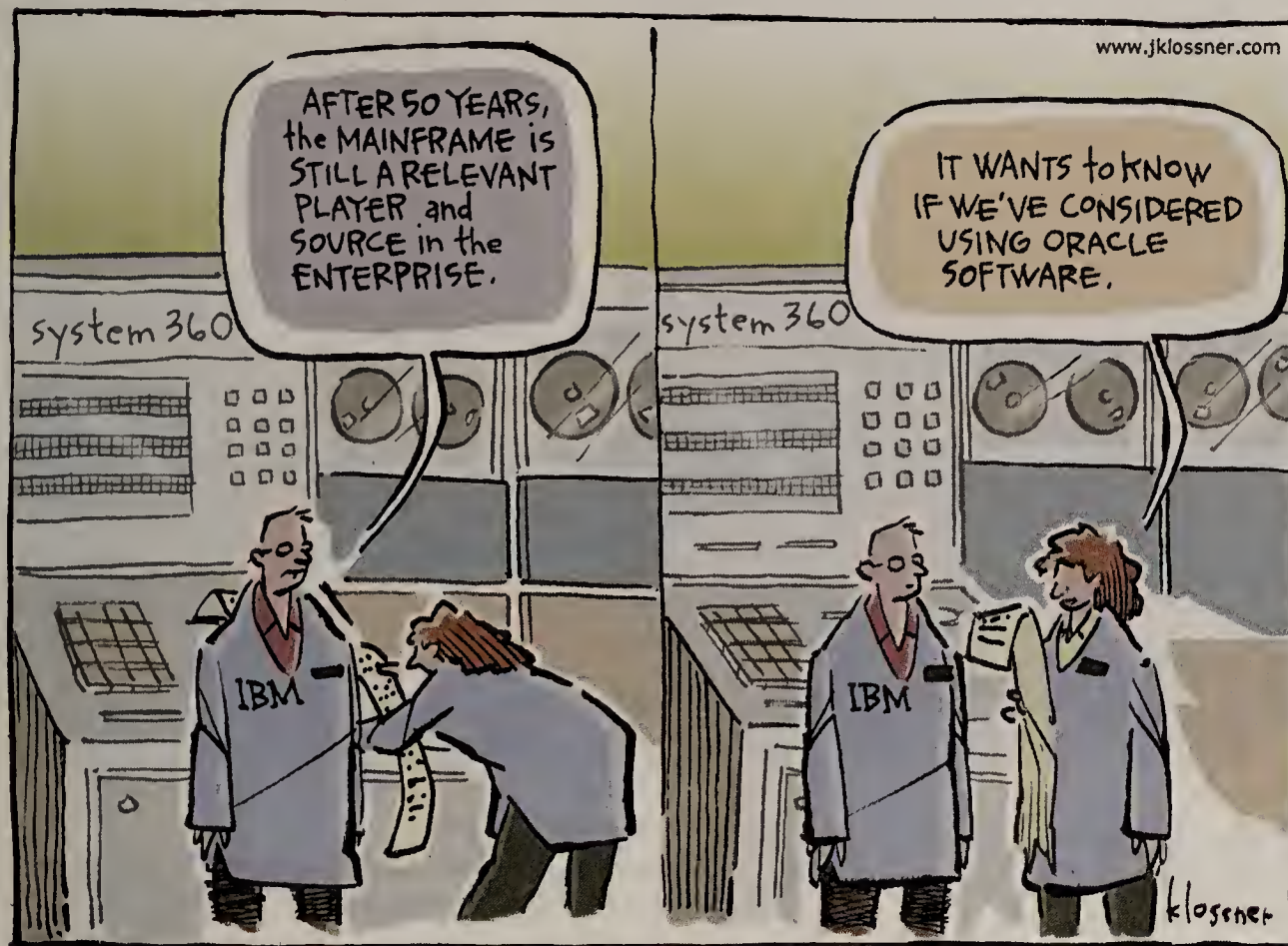
"to grow and advance the business," while spending money to support existing systems, Gartner said.

— CHRIS KANARACUS,
IDG NEWS SERVICE

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BETWEEN THE LINES

By John Klossner



Micro Burst

LEGAL ISSUES

Hewlett-Packard has agreed to pay

\$108 MILLION

to settle U.S. bribery charges.

SOURCE: U.S. DEPARTMENT OF JUSTICE

CLOUD COMPUTING

Cisco Plans to Invest \$1B in Its Cloud Business

Cisco Systems plans to spend more than \$1 billion over the next two years to expand its cloud business.

The networking giant said the key building blocks of the push are Cisco Cloud Services and what it has dubbed an Intercloud — a “network of clouds” that will be hosted across a global collection of data centers operated by Cisco and partners.

The Intercloud will be based on the increasingly popular OpenStack platform, and it will support any workload and interoperate with any cloud, private or public, Cisco vowed.

Delivering on these lofty promises will be a huge challenge for Cisco. The company is late to the game and will have to compete with public cloud providers like Amazon and Microsoft, as well as Google and Rackspace. It will also face competition from infrastructure vendors such as VMware.

Cisco said Australian telecom carrier Telstra is its first partner.

Others that either are planning to deliver Cisco Cloud Services or have endorsed the Intercloud initiative include Canadian communications provider Allstream, European cloud company Canopy and wholesale technology distributor Ingram Micro.

— MIKAEL RICKNAS WITH
JOAB JACKSON, BOTH OF
THE IDC NEWS SERVICE

HARDWARE

2-in-1 Devices Face Slow Slog to Success

MICROSOFT'S EFFORTS to push the concept of a “two-in-one” device — a tablet that does double duty as a notebook — will continue to face headwinds, an analyst said, citing a forecast that pegs 2016 as the first year when more than 20 million of the devices will ship.

In a report by analyst Tom Mainelli, IDC forecast a slow increase in unit shipments of two-in-ones, which the research firm defined as “devices that offer an optional or an included first-party keyboard that physically connects to the tablet to create a clamshell form factor similar to a notebook.”

The researcher estimated 2013 shipments of two-in-ones — including Microsoft's Surface, and products like Asus' Transformer and Lenovo's Yoga — at 6.2 million units. The Surface accounted for about one-third of those shipments.

This year, 10.3 million two-in-ones will ship, according to IDC, which forecasts that the number of shipments will crack 20 million

units in 2016 and climb to 31.2 million in 2018.

In comparison, Apple sold 26 million iPads in the fourth quarter of 2013 alone.

Last year, two-in-ones accounted for 3% of all tablet shipments. The category's share of the tablet market is expected to slowly increase until it reaches about 8% in 2018.

But Mainelli said two-in-ones have a shot. “There will be a PC refresh,” he said. “And rather than a clamshell, some of those will be replaced with two-in-ones.”

For corporate use, two-in-ones that run Windows and Android may be attractive options as PC replacements because they allow users to open multiple windows at once.

“Fundamentally, when we work in Office, you have a Word document, and an Excel spreadsheet or Web browser open next to it,” said Mainelli. “Windows and Android do have the ability to run multiple windows. At this point, that leaves iOS as the only operating system that doesn't do that.”

— Gregg Keizer



New Data Center Tech Is 'Irresistible'

A Bank of America IT exec is convinced that software-defined data centers are the future.

By Patrick Thibodeau

DRIVEN BY A STRONG BELIEF in the value of next-generation software-defined data center technology, Bank of America is steering its IT operations toward almost total virtualization — from the data center to desktop.

The software-defined data center is not yet a reality, but the pieces of technology in place now are enough to convince David Reilly, Bank of America's global infrastructure executive, that it is IT's future.

Backers of the technology say it will do for data centers what virtualization did for servers — decouple hardware from computing resources. If it works, software-defined data centers would enable users to create, expand and contract computing capability virtually, quickly and efficiently.

"The software-defined data center is going to dramatically

change how we provide services to our organizations," Reilly said. "It provides an opportunity for, in effect, the hardware to disappear. We think it's irresistible."

The new technology "will do for data centers what robots have done for a lot of manufacturing processes," said Charles King, an analyst at Pund-IT. New products that can do just that may be revealed in the second half of this year, he added.

In the long run, software-defined data centers "could portend changes in the enterprise and IT industry that are tectonic," said King.

The IT direction Bank of America sets is important to the future of IT. As a whole, the financial services industry is an early — and fast — adopter of emerging technologies. And with its large data centers, it can create markets for new products.

Financial services companies are expected to spend about \$430 billion globally on IT this year, accounting for more than 20% of the projected \$2.14 trillion in overall worldwide IT spending, according to IDC.

Bank of America has been a heavy user of proprietary and special-purpose hardware, but it's finding increasingly less differentiation in such products and has started to replace them with commodity hardware, mostly x86-based systems, according to Reilly. In the near future, he said, "the key for infrastructure is going to be the software that defines it, not the physical hardware layers."

Some of the components that will make software-defined data centers possible are starting to appear.

For instance, VMware last month unveiled a product called Virtual San (vSAN) that offers capabilities that could be important to software-defined data centers.

Part of VMware's vSphere kernel, the vSAN software "decouples dependencies" that exist between applications and the underlying infrastructure, said Alberto Farronato, a VMware product marketing director.

Reilly wouldn't disclose the vendors that Bank of America may work with, but he noted that a software-defined data center that treats networks, storage and servers as computing resource pools will allow the bank to quickly change its computing environment to meet business needs.

Some backers say software-defined technologies will significantly reduce IT costs, but cost reduction has always been a relative concept in IT. While the number of mainframe administrative costs, for instance, has declined over the years thanks to management improvements, IT costs in other areas, such as mobile management, have increased. ♦



The software-defined data center is going to dramatically change how we provide services to our organizations. — DAVID REILLY, GLOBAL INFRASTRUCTURE EXECUTIVE, BANK OF AMERICA



An IBM System/360 Model 91 in use at NASA in the late 1960s.

System/360 Hits 50-Year Milestone

As the first unified computer family based on a single architecture, IBM's mainframe ushered in the modern era of enterprise IT. By Joab Jackson

IN MANY WAYS, the modern computing era began in 1961 at the New Englander Motor Hotel in Greenwich, Conn., where a group of top IBM engineers met in secret to decide how to build the company's next-generation computer.

A new design was sorely needed. IBM's various lines of entirely separate systems were becoming increasingly difficult to maintain and update. "IBM in a sense was collapsing under the weight of having to support these multiple incompatible product lines," said Dag Spicer, senior curator for the Computer History Museum.

The Greenwich meeting spawned a task force that spent three years designing a computer that changed the course of tech history: the System/360, which IBM unveiled 50 years ago this month, on April 7, 1964.

The mainframe system became a huge success — which was a good thing for IBM. The company's president at the time, Tom Watson Jr., killed off other IBM com-

puter lines and put the company's full weight behind the System/360.

Before the System/360, manufacturers built each new computer model from scratch. Software designed to run on one machine didn't work on others. Each computer's operating system also had to be built from scratch.

Led by chief architect Gene Amdahl and project leader Fred Brooks, the System/360 team built a unified family of computers, creating a common architecture that could be shared by both low-end machines and the priciest high-speed models.

"In designing a system with both upward and downward compatibility for both scientific and business customers, IBM was attempting to use a single architecture to meet the needs of an unprecedentedly large segment of its customers," according to a 1987 case study of the System/360 published by the Association for Computing Machinery.

While that seems like the obvious approach today, back then it was a new concept — and it had profound consequences for the tech industry.

Because IBM was able to use a single operating system for all of its computers, engineers could concentrate on developing new applications instead of machine-specific software. On the hardware side, no longer would components, such as processors and memory, need to be designed for each machine.

IBM has maintained backward compatibility for its System/360 offerings ever since. Software for early System/360 computers can still run, sometimes with only slight modifications, on IBM mainframes today.

Pat Toole Sr., one of the original System/360 engineers and later an IBM division president, observed that there were no commercial enterprise software companies at the time. IBM supplied a few standard programs for banks, but customers also wrote their own — a big undertaking.

Nonetheless, companies saw the value of System/360 and other mainframes. "They not only allowed businesses to operate faster and gain competitive advantage but allowed them to have a lot more flexibility in their products and services," said Greg

Beedy, senior principal product manager at CA, who has worked with mainframes for 45 years.

Spicer noted that organizations continue to use mainframes for core operations, if for no other reason than that the cost of migrating software to other platforms would dwarf any savings they might enjoy from less expensive hardware. ♦

Jackson is a reporter with the IDG News Service. **James Niccolai** of the IDG News Service contributed to this story.

“IBM in a sense was collapsing under the weight of having to support these multiple incompatible product lines.”

— **DAG SPICER**, SENIOR CURATOR, COMPUTER HISTORY MUSEUM

THE Grill

C. Martin Harris

This medical doctor and CIO puts technology at the heart of patient care.

Family: Married, with two adult sons

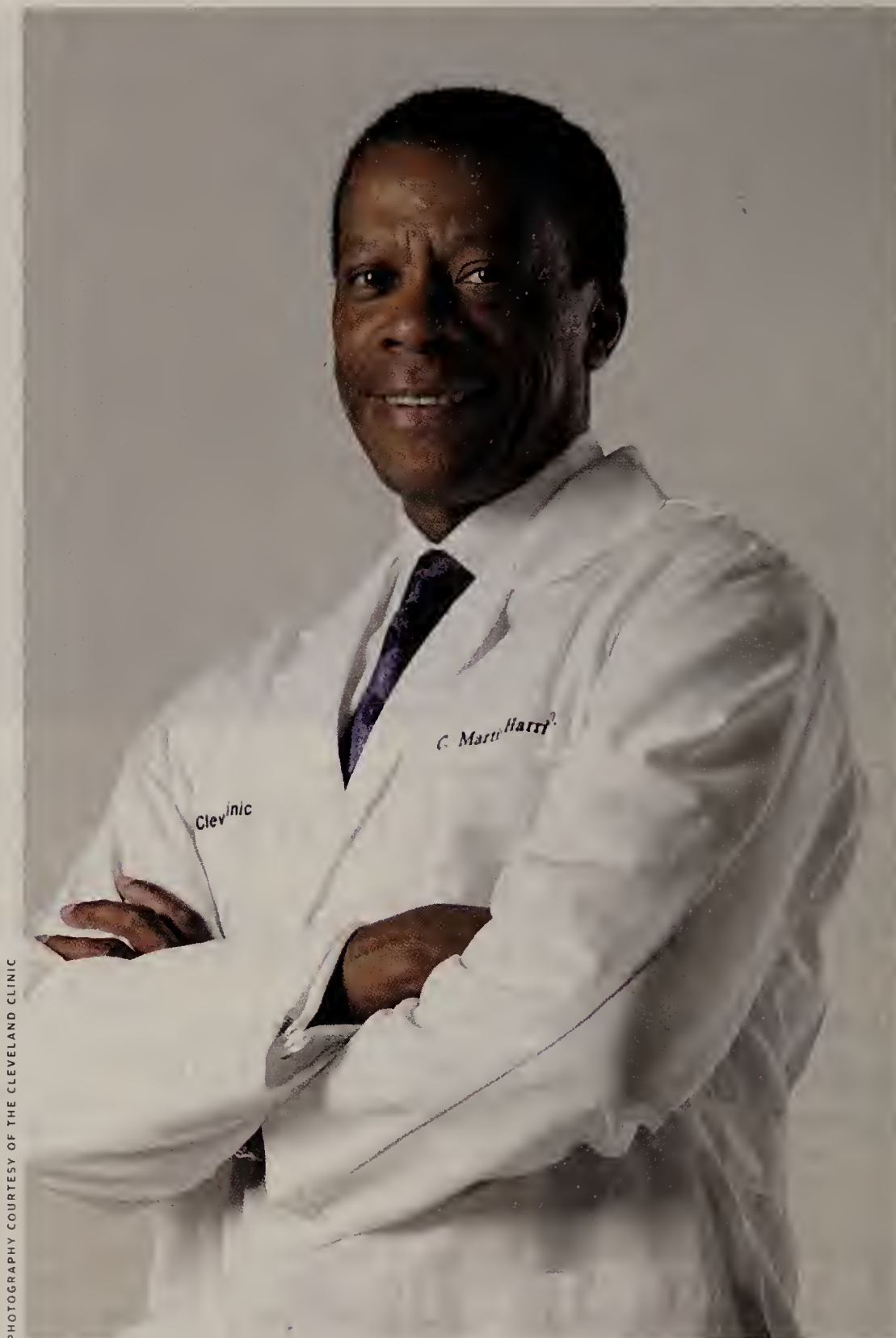
Hometown: Philadelphia

What's on your playlist? "I have a broad list, from Ne-Yo all the way back to Earth, Wind & Fire."

What accomplishment do you take the most pride in? "The very early adoption of electronic medical record technology."

What's the next goal you'd like to achieve? "To see broad adoption [of EMR technology] by patients."

How do you spend your spare time? "A lot of health activities, like a 10,000-steps-a-day activity. Every day, the one who gets to 2,500 steps first gets to brag about it."



PHOTOGRAPHY COURTESY OF THE CLEVELAND CLINIC

B Y DRIVING ADOPTION of information technology, Dr. C. Martin Harris keeps the Cleveland Clinic on the cutting edge of medicine. The clinic's CIO and chairman of its IT division, Harris shares his vision for how technology is redefining healthcare for patients and caregivers alike at conferences nationwide. He is board-certified in internal medicine, is a member of the American Medical Informatics Association and the Healthcare Information and Management Systems Society, and has served as a health technology adviser to President Obama. Here, he offers his diagnosis of the state of healthcare IT.

You've said there's a need to introduce IT "right into the heart of the practice of medicine." What does that ideally look like? Think about all the participants in the healthcare system. That begins with the patient but includes all the care providers — doctors, nurses, allied health professionals. It also includes the administrative aspect of healthcare, such as schedulers, registrars, insurance providers. And when I say "into the heart of medicine," what I'm imagining is that there's a time when anyone involved

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When you have a tool where you can alert both the physician and patient to something that needs to happen, that's a shared experience.

in that cycle will have access to the information they need to make the right decision about that patient as part of the patient-care process or something that facilitates that care process, such as getting a bill paid.

How close is the Cleveland Clinic to that ideal?

In the direct patient-care portion, we're pretty far down the road. All of our physicians use the electronic medical record when caring for patients. We have over 500,000 patients who use a patient portal that we call MyChart to access the exact same information as their physicians. It's been framed differently to be more consumer-friendly, but they're looking at the same results their physicians look at. All our registrars use a system that's part of that electronic medical record, and we use an insurance management system that's part of that system.

Is today's healthcare system close to that ideal? My sense is we're about 30% toward that goal overall. There's a national program that's federally funded known as the "meaningful use" program that's driving the adoption of this technology in the practice of medicine very aggressively. You'll see numbers that show higher rates of adoption of physician and hospital technologies. But when I say 30%, I mean fully functional, not just that you've acquired it or are implementing it, but that you've actually fully implemented it and are getting rid of other things. For example, when patients don't have to call the office to make an appointment or renew an existing prescription or physicians can communicate with patients online.

You've said that technology will redefine the practice of medicine. How will that happen? Imagine you need an appointment to see a physician. Today, the average American would be thinking about where they would physically go to see that physician. Tomorrow, you will have choices about how you would like that appointment. You could have that appointment occur from the comfort of your own home with something

that would look like a Skype or FaceTime session. You'd see a healthcare provider, you'd provide some real physiological information, they'd see you and, in certain cases, with home appliances, they could look in your ears or mouth. That [appliance is] something the average American would have in their homes, like a thermometer today.

Another way of redefining it is we'll be able to use the power of big data analytics to think about the entire population of patients with a particular problem and identify those patients who have chosen not to have a visit. Tomorrow we should be able to use this technology to actively reach out to them on their smartphones and engage them when it's most appropriate.

Where is medical care in terms of that redefinition?

You're beginning to see a lot of interest in this area. You see more and more stories related to [the use of big data], but we are still very early, in our infancy, in terms of our applying analytic tools in the way I described it.

What's been the most important IT advancement to move healthcare closer to that redefinition? It really is the changing attitude of patients/consumers. When we started in 2003, the patient was very skeptical. But consumers have swung out into the front, and they are helping drive this transformation by the rate of their adoption and their ability to engage this information.

What are the biggest barriers to IT-driven medical care? I would call it the activation hurdle. A lot of people think it must be limited by technology or the patient, but you have to reach a certain level of functionality to be truly valuable to all parties. If you go online and the only thing you can do is see test results, it's a minimal value for both the physician and the patient. When you have a tool where you can share all the information and you can use that tool to alert both the physician and patient to something that needs to happen, that's a shared experience. As we grow that functionality, we'll see the adoption climb very quickly for everyone in the healthcare system and you will see the barriers go away.

How have consumer demands around technology changed your IT strategy? The biggest impact is still in front of us. When you look at the generation of smartphones on the market now, they're really the first-generation handheld computer. I can imagine in short order, in 18 months, you'll really have a computer in your hands. And when you do that, there will be a lot more we can do, and it will change what we mean by healthcare access for patients and providers. That will allow us to fundamentally redesign. It changes how you deliver and influences what you deliver.

— Interview by Computerworld contributing writer
Mary K. Pratt (marykpratt@verizon.net)



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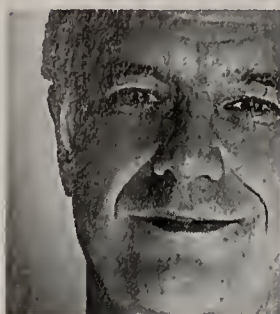
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BART PERKINS

Sound the Alarm!

IT leadership
can fix problems
only if they're
known.

A FORTUNE 500 COMPANY recently learned, within the course of eight weeks, that six major projects were in trouble. In each case, the traffic light went directly from green to red, skipping a yellow warning. The CIO felt blindsided. Executive management wanted

someone to blame. Project teams felt the pressure, and the project management office was asked to explain how this could have happened.

The problems didn't come out of nowhere, of course. But IT leadership can fix problems only if they're known. And problems that fester are more difficult to fix. Unfortunately, project staff can feel strong but subtle pressure to keep problems to themselves. They worry that they won't be perceived as team players if they report any concerns. Less experienced staff can feel an unfounded optimism that convinces them that the project team will be able to recover from missed deadlines by working harder. In the case of the Fortune 500 company cited above, all six failing projects had executive sponsors who were politically powerful and known to attack bearers of bad news. Nobody wanted to raise a red flag and admit that their project was in trouble.

Here are some things that IT management can do to identify problems in a timely manner:

- **Require realistic project plans.** And be prepared to defend them. Not always easy, but crucial. Teams at another Fortune 500 company came under intense pressure to cut project costs, so they reduced the time and budget allocated to training, testing and change management. Those cuts resulted in poor quality and low user acceptance. Project plans without adequate time and resources are doomed from the start. Agreeing to them dooms you to paying a price later.

- **Use agile project management.** The agile approach breaks projects into small pieces and requires tight collaboration between business

and IT staffs, so problems are easier to spot. In addition, agile projects produce frequent, visible deliverables, which can keep a small problem from turning into a huge problem.

- **Listen to the messenger; don't shoot him.**

The tendency to punish the bearer of bad news was a phenomenon recognized by Shakespeare and Sophocles. As far back as the fifth century B.C., the chivalric code in China prevented the executions of messengers sent by an enemy. Sadly, many of today's executives have still not learned this principle, or don't practice it. Make sure employees know they will not be punished for raising concerns, even when other project members deny problems exist. An angry reception stops the flow of useful information. If you have traditionally been a messenger shooter, take steps to reform, and get the word out that you're ready to listen.

- **Review projects periodically.** Project managers often resent formal project reviews (internal or external), believing they take time away from "real work" and provide limited value. But good reviews help project teams step back and re-evaluate project status. The review process should not be adversarial; it should focus on identifying and addressing current and potential problems. While a comprehensive review cannot guarantee success, it can significantly mitigate risk.

All projects encounter difficulties. You need to make sure they turn into bumps in the road, not lethal crashes. Give your project every chance to succeed by seeking information through every available channel and at every possible interval. Make it safe for people to sound the alarm. ♦

Bart Perkins is managing partner at Louisville, Ky.-based Leverage Partners, which helps organizations invest well in IT. Contact him at BartPerkins@LeveragePartners.com.



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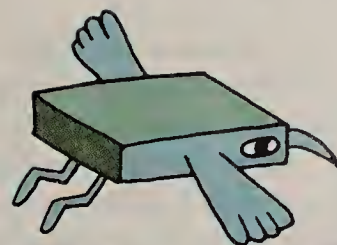
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THINGS

Loads of IP-addressable sensors and other smart devices are descending on the enterprise. **Here's how to be ready to pull it all together.**

By Robert L. Mitchell

A S CIO AT BOEING, Ted Colbert is no stranger to the Internet of Things. For more than a decade, the aerospace giant has deployed thousands of communications-enabled smart devices to sense, control and exchange data across the factory floor, on the battlefield, and within the company's 787 Dreamliner aircraft.

For National Football League CIO Michelle McKenna-Doyle, however, it's a whole new ballgame. Currently the league is experimenting with instrumentation by deploying sensors on the playing field, the ball, and the players and their helmets; it's even exploring ways to track fans.

The Internet of Things presents two opportunities for IT, says Chris Curran, chief technologist and principal in the advisory practice at PwC. "The first requires the CIO to insert himself into the product design and management process," he says. "The second is a new discussion for the CIO to initiate." One concerns product instrumentation; the other is about "instrumenting" the business itself — equipping physical locations, vehicles, devices, equipment, people and so on with sensors and beacons to better understand, analyze and make decisions about the way the business processes perform.

To accomplish all of that, McKenna-Doyle says, "a tighter collaboration with customer-facing business partners is a must."

The Internet of Things (IoT) is set to explode, driven largely by the consumer market, where the number of smart "things" and everyday products equipped with IP-addressable sensors — from wearable smart bands to smart refrigerators — is multiplying exponentially. Research firm Gartner estimates that 26 billion IoT-ready products will be in service by 2020. That's an average of 3.3 devices for every man, woman and child on the planet. And that doesn't include the projected 7.3 billion smartphones and tablets.



JEREMYVILLE

While some of the first smart things were networked sensors used in industrial settings, the definition has broadened. Smart devices increasingly use IP or have access to an IP gateway that can feed data back over the Internet — and over corporate networks. Michele Pelino, an analyst at Forrester Research, describes IoT devices as “anything that connects objects or assets or individuals [and makes it possible to know their] status in a real-time way.” Gartner analyst Hung LeHong’s definition of the IoT includes any connected device or software that can sense and that you can control and use to exchange data. This includes apps that let people send recipes to their ovens, enable BMW owners to unlock their cars if they lose the keys or make it possible for Tesla electric cars to receive automatic over-the-air software upgrades, he says.

As with mobile phones before them, some of these new devices will walk through the office door with employees, while others will be embedded in products that connect to corporate systems from homes and other businesses. And the number of IoT applications spearheaded by lines of business will increase as organizations find new ways to improve productivity, streamline processes and fatten up the bottom line by instrumenting equipment, environments and people and analyzing the data streams generated by those systems.

Even seasoned veterans like Colbert are bracing for an onslaught. What’s different now, he says, is the accessibility of many different types of data, the speed at which the data can be gathered, and the tools a business can use to get its arms around that data. “The pace of development of sensors is moving much faster than folks can keep up with,” he says. And as the cost of developing and deploying sensors has dropped, businesses can capture more data faster and from more parts of more assets than ever before. “This is about solving hard business problems with better data,” Curran says.

It’s a sea change, says Vince Campisi, CIO at General Electric’s Global Software Center. “Before, even if we had the ability to get the cost of the sensor down, we wouldn’t have been able to transport, store and analyze the data.” Now, with the evolution of tools for managing and analyzing big data, he says, “we have both.”

Jim Noga, CIO at Partners HealthCare, reports that while networked sensors have been used in healthcare for years, of late he has seen a marked increase in both the number of medical appliances instrumented with sensors and the number of network-enabled sensors embedded into individual devices. “We’re also seeing more and more of these sensors that live on our operational network,” he says.

For IT, the cost of accommodating IoT initiatives is substantial. “These will be multimillion-dollar investments,” and they

Advanced Package Tracking

ONE RESULT of the IT/OT synergy at FedEx has been the development of SenseAware, a sensor network that allows the shipping company’s customers to track the status of high-value packages in real time. Among other things, they can check the package’s location, the temperature and humidity level at that location, whether it’s in motion and whether it has been opened. Customers can also configure the system to alert them when certain specifications exceed set thresholds or when the package comes within a specified distance of its destination.

That’s a premium subscription service now, but the technology’s cost and power requirements will drop to the point where FedEx can offer it for every package, says Kevin Humphries, senior vice president of enterprise infrastructure services. The initiative illustrates the value of using data collected by the sensors in real time, rather than just analyzing it after the fact. “It’s not just about big data or access to real-time information. It’s what you do with it,” he says.

— ROBERT L. MITCHELL

will require significant R&D investments, says McKenna-Doyle. And business units will expect IT to “knit things together,” she adds.

Supporting IoT projects will require more than basic computing infrastructure changes, says Colbert. “IT will need to retool its computing services portfolio to allow a richer number of simple applications to expose data from the IoT,” he explains.

Here’s a look at four steps IT leaders and analysts say IT should be taking as the Internet of Things proliferates.

1 Ramp Up IT/OT Collaboration

Going forward, upfront collaboration with lines of business and associated operational technology (OT) organizations will be essential. As sensor networks move toward more open architectures, the OT organizations that ran the formerly closed, proprietary systems within each line of business will need to work more closely with IT to resolve a host of issues ranging from integration to security. “IT and OT need to work together to decide who manages, controls and monitors what,” says LeHong, “and it’s no longer clear-cut.” That creates a big opportunity for IT.

For example, if a vending machine can tell when an item is out of stock and send an order to the ERP system, does that mean IT needs another user license? And as OT moves to IP-addressable devices, IT must address network management and security issues. IT may also need to handle software maintenance and upgrades — areas in which OT lacks expertise. All of those issues must be addressed “when things go on the Internet,” LeHong says.

The IoT presents two big security challenges, says John Pescatore, director of Emerging Security Trends at the security research, training and certification organization SANS Institute. Many IoT devices will be consumer-driven, and will therefore start out with weak security and little or no manageability. And even with enterprise-driven devices, IT will face a heterogeneous mix of systems. “IT

“The back-end stuff? The marketers don’t think about that. This is something you have to be proactive about.”

MICHELE PELINO, ANALYST,
FORRESTER RESEARCH

has to learn how to manage devices that aren't all on the same image running the same operating system and the same version of all apps," he says.

CIOs must rethink the network architecture, according to Colbert. "You have to manage the data, manage the networks, and have multiple layers of security in place to allow access to the people and things that need access," he says. "That's hard work in the complex web of networks you have in a large corporation."

There are challenges within OT. For example, Campisi says GE's Predix OT management platform works only with GE sensors, such as those embedded in its jet engines. The company has, however, developed partnerships to offer a more holistic look at optimizing airline operations, ranging from setting crew schedules to operating fleets more efficiently, he says.

But a consolidated management platform for the many different IoT devices out there doesn't exist yet, says Colbert. "There's no single pane of glass that can traverse all of the different types of technologies," he says.

That will change, says LeHong, as machine-to-machine cloud platforms such as Axeda, Etherios, MyKoots and ThingWorx emerge to fill the void.

Colbert agrees. "There will also be hubs, routers and gateways that will combine with cloud capabilities to bring together the disparate IoT," he says.

Right now, though, the underlying infrastructure to support it all is inadequate, says McKenna-Doyle. "These days, CIOs have to be the integrators of all of these specialty devices and capabilities," she says.

Fortunately, IT is very good at dealing with these types of issues. At Boeing, Colbert says, the IT organization has "locked arms" with the factory technical teams. But Curran says that level of upfront participation is the exception rather than the norm. "The tendency is for the product people to just build the product and then come to IT," he says.

CIOs can't afford to get involved after the fact, but that's an all too common state of affairs, says Forrester's Pelino. "The back-end stuff? The marketers don't think about that. This is something you have to be proactive about," she says.

And IT's involvement shouldn't stop there. Many projects create data silos, so IT can also add value by integrating data in back-end systems and performing analytics, Pelino says.

There's no reason IT can't take the lead in leveraging the Internet of Things for business benefit, says Don Fike, vice president and technical architect at FedEx Corporate Services.

"A good place to start is to take a look at your business processes and how they might be impacted by some of the sensor technologies and real-time capabilities," he says. "Step back and

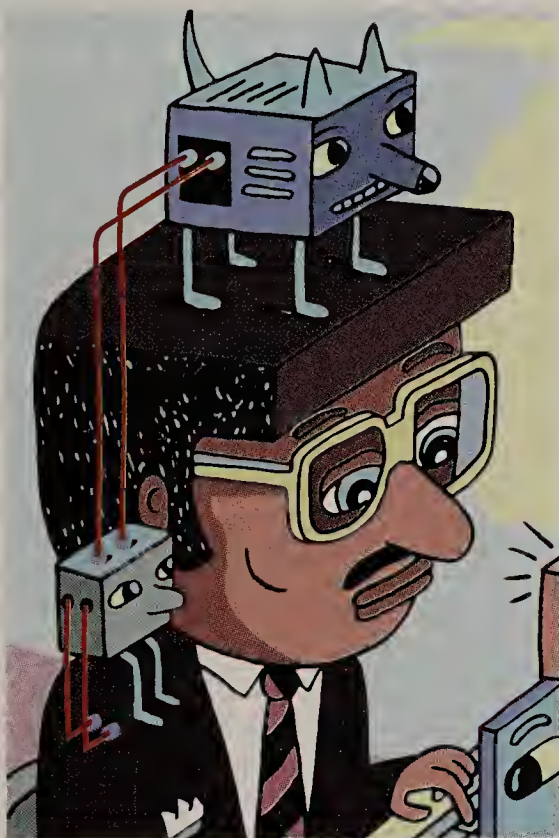
say, 'How can this change my business process?'"

LeHong advises CIOs to take the business's top three products and core processes and think about how the IoT might help. "Can you create a better product or service or process?" he asks.

IT executives should also understand how IT can play a critical role in enabling the technology, operationalizing it and securing it. "The more you're aware of the dynamics, the more you can participate in the discussions," says Campisi, adding that when GE talks to businesses about Predix, the CIO is usually involved from the start.

"This is about solving hard business problems with better data."

CHRIS CURRAN, CHIEF TECHNOLOGIST
AND PRINCIPAL, PWC



2 Learn to Cope With Consumerization

If industrial sensors weren't enough to think about, IT organizations may be asked to engage with consumer devices they don't control, ranging from smart wristbands that monitor personal health to home thermostats. Some devices might walk in the door with employees or customers, while others might connect in from the home.

Smart things that employees bring to work present a risk-mitigation challenge. "Things will be more advanced in the future. And from a threat perspective, they could be designed to circumvent discovery," says Colbert, adding that that's a big concern for Boeing. IT will also need to develop services and policies for properly classifying data from these emerging smart things, and it will have to establish policy enforcement points to control access and enforce usage rights.

But a world in which employees bring their own smart things to work also presents opportunities. For example, Colbert says, "I wouldn't allow sensors to connect to my general-use network to provide employees' location and body temperature to support building maintenance. But providing a segmented network to support the use case? I'd be interested in that."

Other use cases that IT could propose range from programs to improve the safety of manufacturing environments to wellness competitions that use data from employees' personal health monitors to track the progress of participants, he says. "Sensors are ubiquitous, and it would be silly to think that the only way to leverage the Internet of Things is with things I can control," he says.

Karen Austin, CIO at PG&E Corp., has overseen the installation of 9 million smart meters that help customers understand their power consumption. The utility holding company has also installed sensors in power and natural gas distribution systems that can monitor load/generation characteristics, report outages, and shut off valves and reroute power. Now PG&E is experimenting with ways to connect its smart meters to home networks. "All

COVER STORY

of the devices in the home, from the dryer to the thermostat, are getting smarter,” Austin says. “We want to communicate with those devices to allow them to be more energy-efficient.” Adding that IT should think of the IoT as a two-way solution, she says, “You have to be able to handle that from a data and security perspective.”

At Partners HealthCare, Noga faces the challenge of integrating data from consumer-based sensors such as IP-enabled blood pressure cuffs and weight scales into the overall IT architecture. That presents data exchange challenges. Moreover, home devices can't be tested for accuracy and recalibrated the way professional hospital equipment can. Because clinicians can't be sure that the data is correct, they must review all data before it's input into a patient's record. IT also preps the data using decision-support algorithms before clinicians see it. “No clinician wants to review hundreds of normal blood pressure readings,” says Joseph Kvedar, director of the Center for Connected Health, a Partners HealthCare R&D organization.

But there are consumer products that meet professional healthcare standards, and the economics of using such tools are compelling. For example, healthcare products maker iHealth offers an FDA-approved blood pressure monitor that consumers can find at Best Buy. “We give patients a coupon to buy one, and there's no hub and no data charges. That starts to lower our costs,” Kvedar says.

McKenna-Doyle would like to tap into IoT devices that football fans use in order to deepen the level of engagement between fans and their favorite teams. “The emerging [tech] for us is around wearable fitness for the conditioning and management of the overall health of players,” she says. The next step might be to let fans with smart bands go online and, say, compare their heart rates and times in the 40-yard dash with those of star players. But capturing that data raises questions about privacy and governance. “There's a discussion as to whether that's medical data,” she says. Data from IP-enabled smart devices needs to be classified so that IT can determine whether or not it needs reside on a private network.

3 Get Involved in R&D

The best way to get in front of IoT projects is to place IT at the forefront of product development. “IT can be the engine around which prototyping is done with these new sensor opportunities. It can be a big player in vetting ideas before a major investment is made,” Curran says.

For McKenna-Doyle, that means supporting R&D initiatives for projects to embed sensors on footballs, players, the field and helmets. And IT has uncovered many challenges along the way.

Sensors can be used to track who's on the field, map play activity and gather game statistics. But how do you recalibrate field sensors that may get moved — or removed — between games? And how do you overcome bandwidth issues in a stadium packed with 70,000 fans? “This is all R&D,” she says. “Most CIOs don't have a lot of experience in R&D, but if you want to be successful, you'd better start looking at how you can try some of this stuff.”

“You need to have IT consultants who can talk to the OT people so they can build a business plan and present it to a governance body,” says Noga. “We try to be supportive of the Center for Connected Health and provide a lab setting for them to do their testing.”

The Role of Rapid Prototyping

USERS OF Hitachi Medical's MRI equipment didn't always notice the light indicating a cooling system failure. In some cases, by the time technicians discovered that a machine was overheating the magnets had melted, resulting in a \$75,000 part failure. Rather than wait for an embedded sensor, a Hitachi engineer wired in a Twine sensor and breakout box kit from Supermechanical. In a failure, the Wi-Fi-enabled device sends an alert to Supermechanical's free cloud-based service, which forwards a text message to the field technician. Total cost: \$149.

Integrating a Wi-Fi-enabled chip such as Electric Imp or Intel's Edison into every product might cost \$20 to \$30 per unit — an expensive investment, says Gartner analyst Hung LeHong. “But for \$150 you can build a business case,” he says. The Twine kit, with its point-and-click Web service and sensor options, allows rapid experimentation. “It really is easy for even nontechnical people to prototype interactions,” says Supermechanical co-founder John Kestner.

Meanwhile, cloud ecosystem providers such as ThingWorx and SmartThings are providing developer environments and APIs for device makers. And the trend is for each machine to include its own APIs, so people can build the mobile apps they need, says LeHong. The question, he says, is this: “Will IT build that — or not?”

— ROBERT L. MITCHELL

The Partners HealthCare IT unit also helps the center figure out whether the technology will scale. “Things work in the lab, but in the real world, when thousands of people are hitting on the system, we have run into issues. So we sit down with the CTO and his team and go over the architecture,” Kvedar says.

4 Stay Ahead of the Curve

The most important thing is for CIOs to maintain strong relationships with business units — and keep in front of the competition. “It's a partnership,” says Austin. And it's the CIO's job to establish good governance over the process to ensure that the business executes in a way that doesn't put the company at risk. “What the business needs is very important,” says Colbert. “Innovate, but balance that by protecting the crown jewels of the company.”

Plan ahead before you're approached for help with an IoT project, because there isn't time to do an extensive study, adds McKenna-Doyle. “You need to say, ‘Here are the questions you need to ask,’ and we need to have them covered,” she says. “Be flexible and make sure everyone understands the risk/reward profile.”

IT may feel intimidated by the speed at which this is moving, “but for CIOs who can see the value of the data from these interactions, this is a great time to have a seat at the table,” she adds. “Now is the time to embrace this.” ♦

Discussion Underway

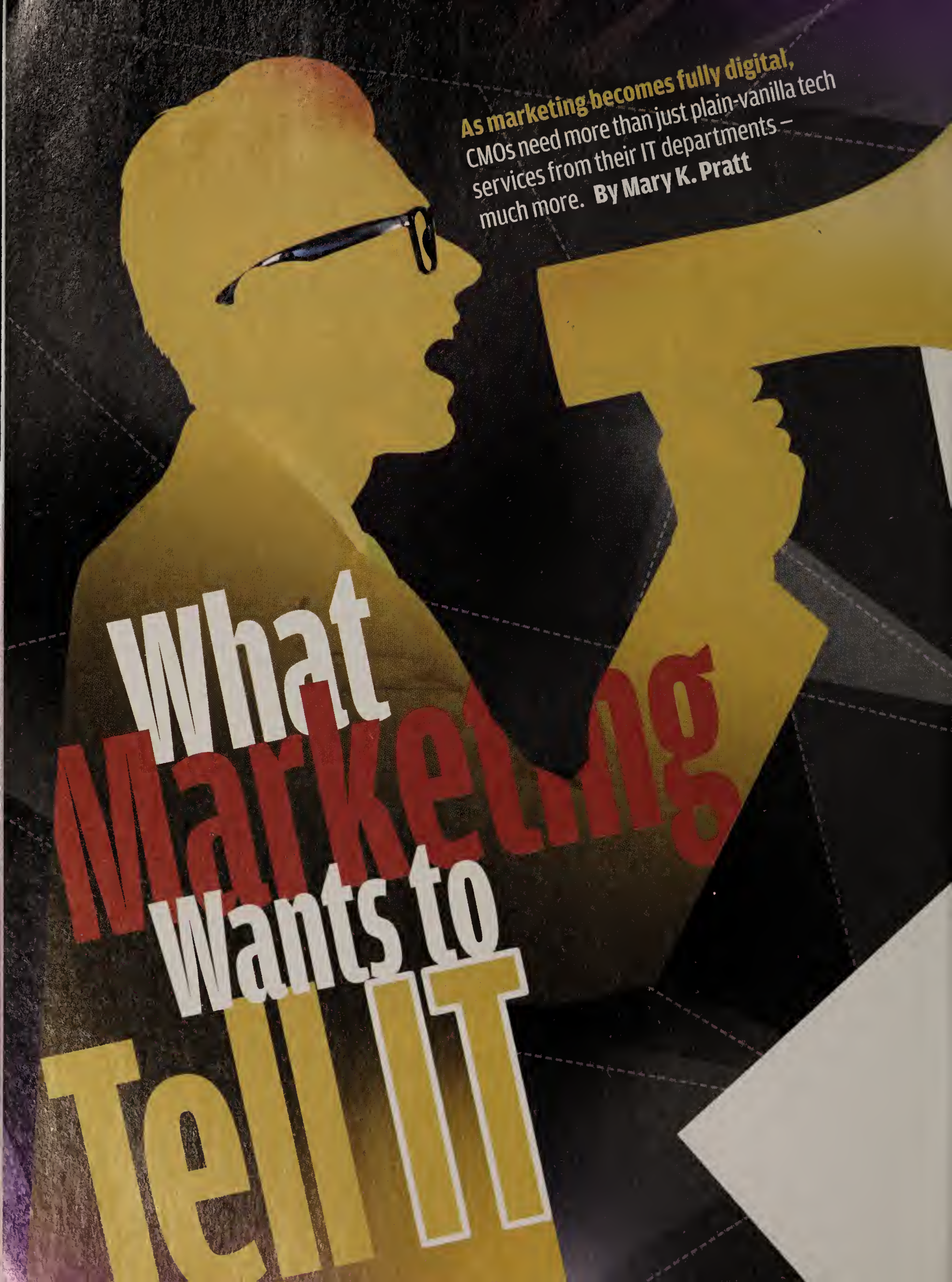


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As marketing becomes fully digital, CMOs need more than just plain-vanilla tech services from their IT departments — much more. **By Mary K. Pratt**

What Marketing Wants to Tell IT

CHIEF MARKETING OFFICER DAVID PERRY KNOWS EXACTLY WHAT HE NEEDS FROM HIS ORGANIZATION'S IT DEPARTMENT. TO MAXIMIZE THE SUCCESS OF HIS MARKETING STRATEGIES, HE NEEDS A CIO AND A TECHNOLOGY TEAM WHO GO BEYOND CONVENTIONAL SUPPORT — HE'S LOOKING FOR A PARTNER WHO CAN HELP TRANSFORM MARKETING. "THE CIO HAS TO HAVE A BROAD VIEW AND HELP US FIGURE OUT WHAT WORKS," SAYS PERRY, CMO AT BENTLEY UNIVERSITY IN WALTHAM, MASS. OF COURSE, IT MUST CONTINUE TO KEEP THE INFRASTRUCTURE RUNNING AND THE SYSTEMS SECURE. BUT THESE DAYS, MARKETING NEEDS MORE THAN THAT — SOMETIMES MUCH MORE. **COMPUTERWORLD CAUGHT UP WITH SEVERAL CMOS AND MARKETING EXECUTIVES TO FIND OUT WHAT THEY'D ASK OF IT IF THEY COULD SPEAK FRANKLY. HERE ARE THEIR SEVEN KEY REQUIREMENTS.**

1 Understand Our New KPIs

Many IT leaders aren't tuned in to what marketing does or how it measures success, says Gartner analyst Laura McLellan. Social media, viral marketing, omnichannel customer engagement, big data — those forces are generating new key performance indicators, or KPIs, which are used to measure the marketing department's effectiveness.

"It's no longer about just acquiring a customer," says Kevin Cochrane, CMO at OpenText, a software company in Waterloo, Ontario. CMOs must maximize a customer's total lifetime value, he explains, and that means marketing must optimize all customer interactions.

To reach that goal, CMOs need as much insight as possible into all customer interactions, from sales and servicing to billing — which is where IT can play a role.

"The technology team needs to understand what generates marketing success," says Glen Hartman, global managing director of digital consulting at Accenture Interactive. "There is so much pressure on CMOs to redefine KPIs — they need to take the outcomes and new metrics and, from that, create heightened engagement."

2 Deliver on Analytics

Everyone is talking about big data and analytics, but at many companies, data remains locked in multiple silos, says Shuba Srinivasan, marketing professor and academic co-lead of the Digital

Technology Sector at Boston University's School of Management.

"Marketers really need integrated databases," Srinivasan says. "The CMO's job would be a lot easier if CIOs could provide an integrated solution that tracks from lead generation through sale and post-sale information, such as returns, and how customers interact with the company on social networks."

It's a critical area for marketing executives. In fact, "managing, collecting and making use of internal and external data" is one of their top five challenges, according to more than 500 marketing professionals who responded to IBM's 2013 Global Survey of Marketers.

3 Guide My Technology Budget ...

According to Gartner, by 2017, CMOs will spend more on IT than CIOs will. Even so, marketing doesn't want to make its tech investments in a vacuum. CMOs want IT to bring its technology expertise, knowledge of existing infrastructure and (newfound) understanding of marketing's objectives to bear in helping marketing make good investment decisions.

"There are a lot of technology platforms out there, and it's very easy as a marketing organization to fall in love with the bells and whistles, but it comes down to business needs," says Bronwyn Monroe, marketing director at NineSigma, a B2B services provider in Cleveland. "IT can be a first filter in terms of collecting the information

on viable systems that fit our needs."

That guidance can extend through the evaluation phase. "When we get to the demo, I like to have everyone in the room to see it at the same time," Monroe says. "The IT people pick up on red flags, whereas marketing is just thinking, 'Oh this is great.'"

Monroe says NineSigma's marketing team has always had an IT staffer help with technology evaluations, but now her department is trying to get IT even more involved, soliciting more feedback about how potential technology investments can meet marketing's strategic goals.

4 ... But Let Me Run My Own Systems

Yes, marketing wants help making IT purchasing decisions, but it also wants more control of its systems once they're up and running.

"Marketing needs to own the entirety of the customer experience," says Cochrane. "I need new business capabilities, and I need to have complete control over system innovation. Let me have more control over the front-end experience. Let me run fast and expose new capabilities."

Cochrane envisions an environment where IT runs back-end systems, oversees the infrastructure and puts in new applications that marketing personnel can manipulate without IT involvement.

He doesn't want his team doing lots of coding or fixing bugs, but he does wish for user-friendly applications that allow his

workers to quickly alter designs, develop a new user experience or create a new technology-driven marketing initiative. "I want to be empowered and empower others in how they interact and deliver personal experiences to customers," he explains.

"It's not just about building another application," Cochrane says. "IT needs to build another layer. We need an 'engagement layer,' and then IT needs to hand over the keys to the kingdom to the people who are listening to customers every day."

5 Loosen the Handcuffs, Please

Veteran CMO Rossanna Wang recently tried to share files with a large pharmaceutical company that's partnering with her employer, Malaria No More, but the nonprofit's IT department considered it a security breach.

"That kind of stuff really limits marketing capability, especially in the social media world," says Wang, who has worked as a marketing executive for several global companies.

Wang says CMOs need IT to loosen the handcuffs a little bit. "Quite often, in my experience, IT is the one who says, 'You can't do this.' There was always a reason, and security was the most knee-jerk reason," she says.

While Wang says she understands the need for restrictions and caution, she says marketing needs barriers to come down so it can be more effective. A strict IT security policy "really limits what marketing can do in terms of being cutting-edge," she adds.

New Job: Chief Marketing Technologist

A S BIG DATA, social media and mobile shake up the old world order, companies are creating positions to bridge marketing and IT, and take full advantage of new tech-driven opportunities for customer engagement.

One new title, found primarily at large and very large companies, is the chief marketing technologist. In Gartner's 2013 U.S. Digital Marketing Spending report, which was based on a survey of more than 200 marketers from U.S.-based companies with more than \$500 million in annual revenue, 72% of the respondents indicated that their company had a chief marketing technologist-type role.

Gartner analyst Laura McLellan says that, in 80% of the companies that have the position, this person reports to the CMO.

The chief marketing technologist is responsible for understanding both available and emerging marketing technologies and articulating how marketing can capitalize on them. Depending on the company, the position may also be involved in procurement or in setting up a center of excellence between marketing and IT. McLellan says most chief marketing technologists are strategic, although some are more tactical in their duties.

There are, not surprisingly, companies where IT and marketing departments don't play well together, she says, but most organizations are moving along a continuum of having the two functions work collaboratively with increasingly blurred leadership, whatever the titles might be.

That momentum will continue, McLellan predicts, as customers increasingly use technology to interact with business. "It's a big shift," she says, "and it's going to be a bigger one as we move from digital marketing to digital business."

— MARY K. PRATT

6 Teach Us How to Dive Deep

Monroe says she knows that the people on her team can get more of out NineSigma's existing marketing systems, but they need help coaxing it out. She wants IT to give her staffers some advanced training, such as working with them on writing code for the company's customer relationship management system.

"We need to build up our skills and be a DIY operation," Monroe says.

She is motivated in part by tight deadlines. Her marketing folks need to be able to get what they need quickly; waiting for an IT staffer to show up to help takes too much time. Plus, she says, the more technically proficient her own staffers become, the more likely it is that they will explore the outer limits of their existing systems.

"We want to know where this system can help us generate more data. For example, how can it help us measure our performance?" Monroe explains. And rather than waiting for IT, "you really have to build up your own skills," she adds.

7 Help Us Meet Our Customers Wherever They Are

For a long time, marketing focused almost exclusively on outbound messaging — reaching out to current and potential customers — but social media has made marketing's work increasingly interactive. Not only do marketers need to pay attention to inbound and outbound messages, they need to do so in real time.

CMOs say they need IT professionals to have a keener understanding of these requirements, so they can design systems with the agility that marketing now requires. "I really want them to understand how we need to use technology [to reach] external audiences," says Perry.

In many organizations today, marketing staffers handle all customer interactions — outbound, inbound and those happening on social media — and they need technology that allows them to interact with customers at any time in any of those media.

"All these things are coming together in ways that make marketers say, 'We have to make more sense of this,'" McLellan says. "It all has to be managed, and that has to happen in as close to real time as possible. Agility and speed are two major drivers, neither of which have traditionally been the purview of IT." ♦

Pratt is a Computerworld contributing writer in Waltham, Mass. You can contact her at marykpratt@verizon.net.

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RISE OF THE QA EXPERT



Long undervalued, **quality assurance is in the limelight** – and QA pros are in demand – as security breaches and rocky website rollouts continue to make headlines.

By Beth Stackpole

MIKE BRESNAHAN'S CAREER has been a bit of high-tech potluck. In the early years, he did hands-on IT administrative work, tending to printers and managing server farms. From there, he crossed over to the development side, putting his proficiency in programming languages to use across a wide range of software projects.

Today, Bresnahan is on neither the IT nor the developer track. Instead, he's climbing the corporate ladder in quality assurance (QA), which he sees as a perfect fusion of his past endeavors that lets him focus on the future.

"QA allows me [to transition from] a pure developer role into working in the real world without having to just do IT work," says Bresnahan, QA manager at Zenoss, an Austin-based provider of monitoring and management software for IT infrastructure. Bresnahan, who got into QA 15 years ago, is now in talks with management to create a new director-level QA position at Zenoss. "QA gives you the ability to be the first person to take whatever new technology a company is working on and make it work in a real-world situation," he says.

Bresnahan is far from the only QA professional jacked about the job. In a 2012 CareerBliss survey, respondents ranked senior QA engineer as the No. 2 happiest job, trailing only real estate agent. And FedEx's Tamara Payne is one QA pro who has found the work to be rewarding. A senior vice president at the shipping giant, Payne earned a significant amount of professional recognition by cutting the amount of time it took to test software.

Yet despite practitioners' high levels of personal satisfaction with their work, QA still struggles to command respect from the rest of the organization and is often considered a secondary role, trailing in the IT pecking order behind more coveted developer positions.

"It's not the sexiest of roles," Bresnahan admits, "and in the food chain of IT, we are one step above the documentation team and maybe two steps above tech support. Yet if you can find the good companies that allow QA to [function as a] bridge between pure development and real-world deployment, there is real opportunity there."

QA Pros in High Demand

Apparently, a lot of companies are starting to see it that way. As the complexity of software grows, so too does the need for more thorough QA practices, including the development of automated testing procedures. These demand a higher-caliber professional with a different set of skills — think programming rather than manual troubleshooting, experts say. High-profile technology project disasters like last fall's rollout of the Affordable Care Act (ACA) website have also highlighted the importance of QA best practices, further enhanc-

ing the discipline's reputation.

"The role of QA is becoming more important and enjoying a higher level of perception in the organization," says John Reed, senior executive director of IT staffing firm Robert Half Technology. "At one point, people would say it was a necessary evil, like an auditor. Now people are starting to look at it as a role that can bring about significant benefits, helping organizations create better products and ensuring there are fewer bugs upon rollout."

The troubled rollout of the ACA website didn't hurt in terms of elevating QA's standing, Reed agrees. "Any time there are trends in the media that relate to technology, it catches people's eye," he explains. "The minute a bank has a security breach, all banks take another look at security. The second a healthcare facility has a [data] breach, all hospitals rush to see if they are exposed. Now any organization with a website on the runway is questioning whether they have done due diligence from a QA perspective."

Heightened awareness about the significance of QA is cultivating demand for lots of QA-related jobs. According to TEKsystems, the hiring climate for QA roles is intense. There are 2.5 positions open for every one QA person available, says Jason Hayman, research manager at the IT services, staffing and talent management company, noting that there was a more than 10% increase in unique job postings related to QA engineers and testers from 2012 to 2013.

A QA job can be a steppingstone to a variety of other IT positions, Hayman says. For example, lower-end QA work doesn't necessarily require a deep technical background, so it can be a great entry point into IT in general, he says. QA can also be a gateway to programming or product management.

In many cases, however, people who get immersed in QA tend to stay there. "Given that the need for QA professionals is so great, once you're recognized as a great

QA person, there's a hesitancy to let that person move on to other roles," Hayman explains.

Deep, Hands-on Experience

While many companies are definitely placing a higher value on the QA function these days, others still have a tendency to give the role short shrift. Companies that develop complex software tend to emphasize the importance of strong QA processes and automated testing. But internal IT organizations may be less likely to see the value of QA, according to Bruce Webster, principal and founder at Bruce F. Webster & Associates, an Englewood, Colo.-based enterprise IT consulting firm that specializes in helping clients with troubled or failed IT projects.

"Organizations that produce excellent software products take QA very seriously, but in internal IT organizations, QA is generally not seen as something that's essential, nor is it seen as something that is desirable," Webster explains. "Nontechnical management often doesn't appreciate the absolute necessity of rigorous QA, and they just don't want to spend the money on it."

One of the trends changing that perspective is the need for much more sophisticated and automated QA testing procedures to put today's intricate and highly complex software through its paces. Companies prioritizing rigorous test processes are shifting away from staffing QA departments with low-skilled, low-paid workers and are instead recruiting higher-caliber QA professionals who are fluent in the latest programming languages and agile development methodologies.

Rather than looking for candidates with formal technical QA certifications, companies are seeking out applicants with deep hands-on experience along with strong communication, project management and problem-solving skills, Reed says.

"Any organization with a website on the runway is questioning whether they have done due diligence from a QA perspective."

JOHN REED, SENIOR EXECUTIVE DIRECTOR, ROBERT HALF TECHNOLOGY

IT CAREERS

"The profile of people filling the QA role has changed in the last few years to become far more sophisticated," says Kevin Haggard, director of quality engineering at online coupon site RetailMeNot.com, who has worked in QA for 15 years for such well-known sites as WeightWatchers.com, WebMD and Gilt Groupe. "We're looking for people who have a lot more of a technical background and more programming experience than we have in the past. Before, you would just look for people in any field and teach them how to do manual testing."

Not only are director-level QA professionals like Haggard seeking a different breed of QA engineer, they are willing to pay top dollar for their hires. In some markets, a seasoned QA technician can command a six-figure salary on par with top developers, Haggard says, and there's less competition for those jobs. "If you're great at [writing scripts for automation], you can probably demand a lot more than a developer competing in a division where there are 10 people vying for the job," he says.

A Wide View of the Organization

Michael Chapman, a senior QA analyst at Datacert, a Houston-based provider of enterprise legal management software, says he regularly gets offers from employers seeking out good QA talent. Chapman started out as a C++ developer, but after seven years

"The profile of people filling the QA role has changed in the last few years to become far more sophisticated."

KEVIN HAGGARD, DIRECTOR OF QUALITY ENGINEERING, RETAILMENOT.COM

oper," he says. "I became more of a software expert in QA in terms of testing every part of the software from soup to nuts."

Similarly, Bresnahan says he likes the broad organizational exposure that his QA role at Zenoss affords him. As QA manager, he offers the development organization guidance about where to focus limited resources; hosts review meetings with representatives from support, services, sales and engineering to negotiate risk-based decisions for releasing new products; and supports developers by providing information on field issues and expectations.

With the QA director role in his sights, Bresnahan hopes to push his cross-functional focus even further. "The role of QA director is to be an information provider to their peers," he explains. "They are the source for what is and isn't acceptable and can help mitigate risk for the executives, assist peers in focusing on specific quality improvements, and shield the development organization from external [fear, uncertainty and doubt] using quality metrics. They are the voice of reason when people start running around with their hair on fire."

As global IT quality assurance manager at Woodland Park, N.J.-based Cytec Industries, Doug Gabel says he's not only the voice of testing at the specialty materials and chemicals manufacturing firm, but also the advocate for moving QA testing upfront in the development process. Organizations that do that can catch potential system snafus much earlier, ensuring that rollouts will go more smoothly.

Gabel has pushed to make QA best practices part of the software development life cycle at Cytec and to champion the benefits of QA to the organization at large.

"It's my job to highlight the benefits of QA testing and to educate people as to what testing is and when the best time is to do it," Gabel explains. "I have to make sure testing is part of everyday operations. It's an ongoing challenge, but it's been a good career move for me. I've had the opportunity to gain wide business experience." ♦

Stackpole, a frequent Computerworld contributor, has reported on business and technology for more than 20 years.

Summer Camp for QA

NEWLY MINTED COLLEGE GRADS aspire to be Web developers, mobile app programmers, even business intelligence analysts. One IT job not on their radar screen is QA engineer, but a group called SummerQAMP aims to change that.

Sparked by a conversation about job creation between IT luminaries and rock icon-turned-jobs advocate Jon Bon Jovi, SummerQAMP was created in 2012 as part of the White House's Summer Jobs+ initiative.

The nationwide venture aims to place students in quality assurance internships at major technology companies such as Gilt Groupe, eBay, Foursquare and Airbnb. After the success of the first year's pilot program, SummerQAMP branched out this year to eight U.S. cities, including Boston, Austin, New York, San Francisco, Los Angeles, Chicago, Washington and Atlanta.

SummerQAMP introduces high school and college students to the QA role while teaching them QA skills and helping them search for jobs. "In the United States, we don't do a lot to teach people about testing — it's never mentioned [before] someone starts their career, and they don't know it's a viable job opportunity," says Kevin Haggard, a co-founder of the program and director of quality engineering at RetailMeNot.com. In addition to Haggard and Bon Jovi, GroupMe co-founder Steve Martocci and former White House CTO Aneesh Chopra were the brains behind SummerQAMP.

About 100 students have gone through SummerQAMP since its founding, and Haggard says the program has helped raise the profile of the QA role as a viable career option. "It's pretty hard to find qualified QA candidates," Haggard says. "Countries like India and China do a much better job training people in testing, so it makes it easy to outsource the role there. We wanted to make sure this is an opportunity for people to have a well-paying job here."



— BETH STACKPOLE

Security Manager's Journal

MATHIAS THURMAN



Virtual Machines, Real Mess

When Internet and phone service goes down, the problem is traced to VM images installed in a classroom.

I T STARTED OUT as a simple call to the help desk from an engineer at one of our major development centers: Phone calls were being dropped. Soon, similar complaints were coming in from other engineers, as well as from sales associates, who said the inability to maintain phone calls was making it difficult to close deals.

Anything that affects revenue is sure to get someone's attention. The telecom team checked out the Cisco call manager and gateways; they were fine. It wasn't until the help desk received a new set of complaints about Internet connectivity being slow at that same development center that someone decided to get the security department involved.

The head of our network team, who is also responsible for firewall administration, sent me a message that was sure to get my attention: "You better come check this out." What he had to show me was that the logs from the firewall protecting the development center were filled with outbound connections over Port 445 to several locations on the Internet.

We had to contain that activity quickly to return Internet and phone service. Our

attempt to block the outbound traffic at the firewall didn't succeed, since the logs had taken up so much of the firewall's resources that we couldn't do anything at all on the firewall. The network engineer placed an access control list on one of the routers, which eventually allowed him to modify the firewall rule to block the bad traffic. That got us back the Internet and phone service, so the immediate problem had been remediated. But what had caused it? I had the engineer back up the logs so we could analyze the data.

Our review showed that the IP addresses that were generating the traffic were assigned to a classroom. The instructor told me that

the trainees had installed a virtual server image on the classroom desktops and, contrary to normal classroom protocol, connected the virtual machines to the corporate network. We found that those virtual machines were not running any antivirus software and hadn't been patched in more than two years, so we ran a virus scan of one of the virtual machines. Suddenly, everything became very clear.

The virtual machine was infected with

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Trouble Ticket

» **At issue:** Phone and Internet service is severely compromised at a development center.

» **Action plan:** Restore service, then find out what went wrong. And once that's done, take steps to avoid a repeat.

a virus whose characteristics matched the activity that caused the denial of service to the office. In fact, all 30 desktops in the classroom were infected. But that's not the worst of it.

The installed images were derived from a base image maintained at a cloud provider. That base image contained the virus, which explains how 30 machines became infected.

Patchless

I then moved on to the person who was responsible for provisioning virtual-machine images to find out why steps hadn't been taken to avoid an infection. He explained that a couple of years ago some patches had caused images to become unstable, so patching was stopped. As for antivirus software, he said he didn't have the budget to install it on more than 1,500 Microsoft Windows images. Perhaps that explanation was supposed to mollify me, but I could barely contain my dismay. Fifteen hundred VM images that had little or no protection from viral infection! And those images were regularly used by several departments on machines operating on our corporate network.

I immediately called a meeting with our CIO and the vice presidents for the divisions that deploy virtual machines. I called for an immediate mandate to scan all images, install our corporate antivirus software, update all patches and put a process in place to ensure that images comply with the company's patch management process.

All in a day's work, right? ♦

This week's journal is written by a real security manager, "Mathias Thurman," whose name and employer have been disguised for obvious reasons. Contact him at mathias_thurman@yahoo.com.

The firewall logs were filled with outbound connections over Port 445.



OPINION

S.J. VAUGHAN-NICHOLS

The Best Smartphone? Wrong Question

You have to ask yourself, 'What can't I do without in a smartphone?'

AS MY TOWN'S resident technology expert, I am sometimes approached by complete strangers with tech questions. Lately, 9 out of 10 ask, "What's the best smartphone?"

I can see in their faces that they would like a straightforward

answer, something along the lines of, "Buy Samsung's Galaxy S5; you'll love it." But I can't say that. That's not because the Galaxy S5 isn't an excellent phone. Everything I've heard about it tells me that it is.

The only answer I can ever give is, "It depends." And I follow that up with, "What are you going to be using the phone for? What do you really need from the phone? What can't you do without in a smartphone?"

For some people, including me, the first consideration is whether the phone has a physical keyboard. I hate typing on a screen, which is one reason I'll never be an Office for iPad user. For me, a physical qwerty keyboard isn't just nice to have; it's a must-have. Given that priority, the best smartphone I've found to date is the Motorola Droid 4.

But if a physical keyboard isn't a priority for you, I very much doubt that you would think very highly at all of my two-year-old Droid. What's a great phone for me could well be a dud for you or someone else.

It's all about your priorities. Do you want a smartphone that will work as a replacement for a point-and-shoot camera? Your best choices in that case are probably Apple's iPhone 5S or the Nokia Lumia 1020. But maybe playing games or watching videos is your top priority. If that's the case, the best graphics tester on the planet — Display-Mate president and research scientist Raymond Soneira — thinks you'll love the Galaxy S5.

For some people, it all comes down to apps. The argument over whether Android or iOS has the

best applications will never be settled because the answer is personal. They both have thousands of great apps, but the only thing that really matters to you or any other individual user is whether they have the one app that you need above all others.

Other factors come into play in the Android/iOS divide. Personally, I prefer Android because I like open systems. But other people like the security of knowing that any up-to-date iPhone is going to work with the latest version of iOS. I have no such confidence in the Android world where I have chosen to live, but that's a trade-off I've decided I can accept.

The Runners-up

Of course, the smartphone universe is bigger than Android and iOS. What about Windows Phone? Firefox OS? Ubuntu? Well, here I can give you a definitive answer: no. Windows Phone is a fiasco; stay away. I can find good things to say about the other runner-up smartphone operating systems, but you won't have much choice in hardware or applications. What about BlackBerry? Well, if your top priority is securely accessing corporate email, or if you're the president of the United States, a BlackBerry may be for you.

In short, there are no "perfect" smartphone choices. There is no "best" pick. There's only what will work best for you. Look at your needs, look at what you want, and check out the reviews of the latest and greatest. Then you'll be ready to find your best smartphone. ♦

Steven J. Vaughan-Nichols has been writing about technology and the business of technology since CP/M-80 was cutting-edge and 300bps was a fast Internet connection — and we liked it! He can be reached at sjvn@vna1.com.



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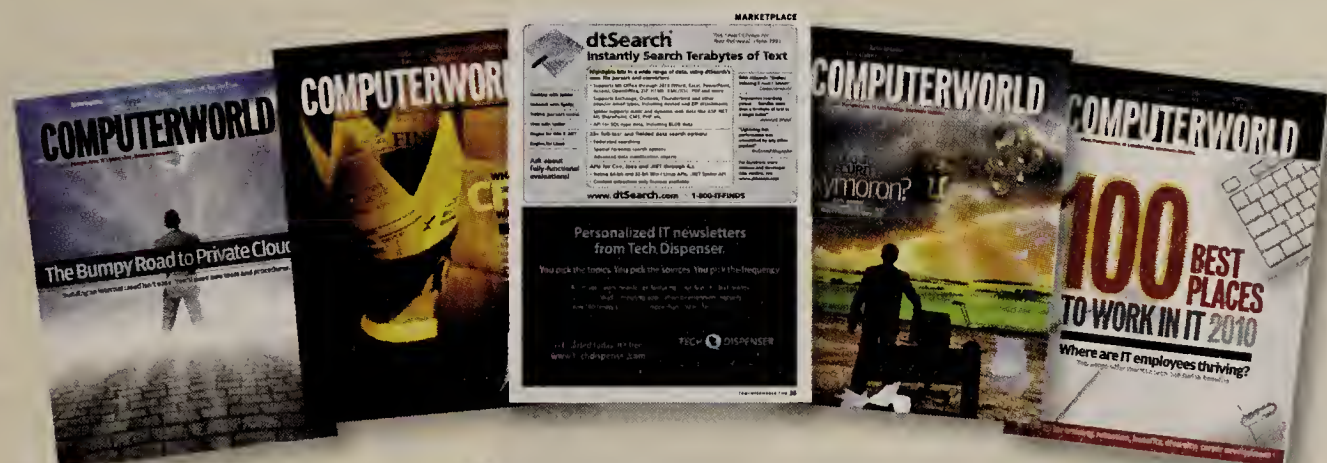
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Career Watch

Was HP's CIO the **Best Paid** in the Country in 2012? Maybe...

NETWORK WORLD last autumn took a look at CIO pay and came up with a list of very handsomely compensated IT executives. Are they the best paid in the land? Quite possibly, but it's not a certainty.

Network World started by looking at proxy statements filed with the Securities and Exchange Commission by the 500 largest companies in the U.S. So, then, for starters, its list is derived only from the pool of publicly traded companies, and a CIO at a privately held company could have been compensated more generously in 2012. The IT news site, one of Computerworld's sister publications, then zeroed in on CIO compensation, but not every proxy statement lists that information. Companies are required only to divulge the compensation of their CEOs, CFOs and their three highest-compensated executive officers. Sometimes those officers included the CIO; sometimes they didn't. It's possible that there are CIOs at publicly traded companies who received more in compensation last year than HP's John Hinshaw, but that information wasn't included in their companies' proxy statements because the CIO was not among the company's three highest-paid executives.

With that caveat out of the way, here is a breakdown on the compensation of the potentially best-paid CIO in the U.S.

JOHN HINSHAW



Hewlett-Packard, executive vice president of technology and operations

Hinshaw joined HP in late 2011, filling a newly created position that spans tech and business. He oversees company operations, including global IT, sales, procurement, business shared services, real estate and security.

Before joining HP, Hinshaw held a

number of senior IT positions, including CIO at Boeing and CIO at Verizon Wireless. **His \$8.2 million compensation included his \$625,415 salary, a \$1.5 million signing bonus, a \$551,028 performance-based cash bonus, equity awards valued at \$5.1 million, and \$375,990 in perks and other compensation.**

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MILLION**



ASK A PREMIER 100 IT LEADER

Juan Perez

*The vice president of information services at UPS answers questions about **business education for IT pros** and the importance of training.*

I will be finishing up my computer science degree over the next few months. I have several technical topics I want to sign up for, but I've been advised that I should give up some of them and take some general business courses instead. What do you think? In my experience, engineers and developers who have an understanding of general business practices and who get close to business processes provide great value to the organization. As you pursue management

roles in IT in the future, it will become more critical to have a good understanding of the impact technology has on an organization's results. Having the ability to understand return on investment, total cost of ownership and the levers that help your company succeed can be effective tools in

If you have a question for one of our Premier 100 IT Leaders, send it to askaleader@computerworld.com, and watch for this column each month.

allocating IT investment and managing IT groups. So I think it would be beneficial to take some business courses as you complement your technical education. Accounting, financial management, organizational behavior and operations management are excellent candidates.

My company is stingy with training opportunities. I can come up with many arguments as to why this policy is bad, but I'm not a real good salesman. Any advice on how to present these arguments so they're persuasive and not just confrontational (my usual style, I'm afraid)? No need to be confrontational. As an IT professional, it is imperative that you keep up with your skills, especially in such a dynamic and constantly changing field. And looking at it from a competitive perspective, you can be sure that your competitors are finding ways to develop and recruit top talent to compete with your company. This has been my first argument every time I have requested support for training. I also like to categorize things in the form of return on investment, using the rationale that if I get trained in a particular area, I will be able to return the investment by doing (fill in the blank). And lastly, it is important that you describe clearly the consequences of not providing training for the IT team. And there are many. In the end, your organization may still elect to defer training costs driven by a variety of business factors. But the key is to not give up. Keep asking relentlessly, without being confrontational.

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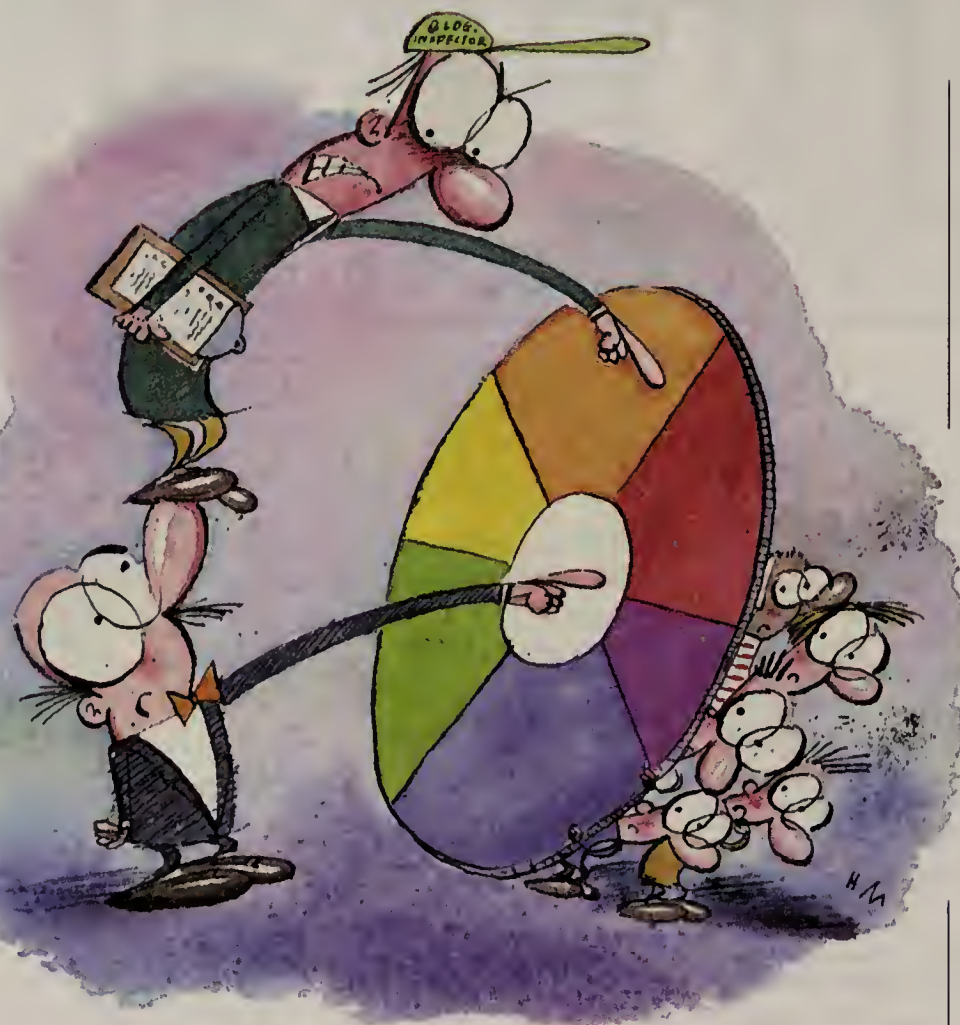
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HAL MAYFORTH

Orange Is the New White, Too

It's the late 1990s, and this pilot fish works for a big electric utility. "Fiber optics was the new thing, and we had to have it," says fish. "The contractors ran the fiber throughout the building. In the offices, it was hidden from view, and nobody could see the orange covering. In the basement, where we all lived, it was run overhead and through the support beams, and you could clearly see the bright orange sheathing." That doesn't bother fish and his cohorts. But one day the company president

happens to stop by IT. He spots the orange sheathing, in stark contrast to the white that covers everything else. And he promptly orders the sheathing changed to white. Fish and his co-workers point out that the fiber cable *has* to be orange, per the building code. "This went up the chain and back down — and a contractor was hired to change the sheathing to white," fish reports. "Shortly after

this project was completed, a building inspector was making his rounds. He asked where the orange sheathing was for the fiber optics. About two weeks later the white sheathing was replaced with orange."

Get the Message?

Distraught user calls this IT pilot fish to report that she sent an important email to a customer and cc'd some

co-workers and herself — but it never arrived. "The email bounced back as undeliverable," fish says. "The user was extremely upset. She wanted me to drop anything I was doing and check into this because this was vital, and the very lifeblood of our company depended on this email going through. I requested and got a copy of the message sent to the customer, read over the email metadata and went through the logs to find the reason why this email had bounced back at her. As it turns out, most of the copies of the email delivered just fine. The only one that bounced back was the cc: to her — because she misspelled her name in her email address."

Recipe for Failure

This company uses an older system for handling its retirement plans — and we're not talking a mainframe here. "It's a homegrown, 22-year-old DOS-based system we use to manage profit sharing, 401(k) and stock options," says a pilot fish there. "Many of the data fields are free-form, allowing the users to enter any value they want. While troubleshooting a problem with the ESOP forfeitures recently, I saw some data that I'm fairly certain didn't belong there. In the TransactionScope field for a 2011 entry, I found the following:

The Mix
1/3 cup raw rolled oats
1/2 cup plain low-f

"Which may explain why the stock options are a mess."

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— OPINION

THORNTON A. MAY

Your Privacy Map Is Probably Wrong

I don't think privacy professionals are giving us the answers we need.

FUTURISTS like me love maps. Not necessarily physical maps, but the collection of data points that can tell us where we have been, where we are and where we're going. For many of my colleagues, the enterprise that's in the worst position is the one that has to ask

"How did we get here?" That's bad, but I believe that "Where are we?" is even worse.

This is the beef I have with the privacy sphere of our industry. Most organizations don't know where they are in regard to privacy. Maps are not just navigation aids. They are thinking tools. Maps are mirrors that reflect how we think about something. In the case of privacy, the maps being used today shout that organizations have not thought long enough or hard enough about privacy. The privacy maps I have seen do not answer these three essential questions that maps should resolve: "Where have we been?" "Where are we now?" and "Where are we going?" I don't think privacy professionals are giving us the answers we need.

About seven years ago, I excoriated the privacy industry for not being on the map of key enterprise decision-makers. This shot across the bow did not elicit much of a response. Today I will up the oratorical ferocity by claiming that value-maximizing boards of directors are demanding privacy maps, but the cartography currently practiced by most privacy professionals falls far short of what is needed. It is time to remap the privacy space.

Maps are powerful tools for conveying meaning and guiding action. But bad maps convey false meaning and misguide our actions. Unfortunately, bad maps have a long history in IT. Who can forget the once almost universally held conceit that users were not smart enough to buy their own computers? Or the pantheon of now thankfully retired CIOs at name-brand enterprises who declared that PCs were toys? (I invite readers to email me their thoughts on bad IT maps.)

Privacy map makers need to ask themselves some basic questions. Reading the rich literature of cartography (see *Rhumb Lines and Map Wars: A Social History of the Mercator Projection*, by Mark Monmonier, and *The New Nature of Maps: Essays in the History of Cartography*, by J.B. Harley), one learns that the first question one should ask when examining a map is "For what purpose was this created?"

The privacy maps being created today are primarily prophylactic in purpose, designed to avoid lawsuits. This begs the question, "What role do chief privacy officers really play?" Are they spinmeisters — the release point of canned and increasingly meaningless apologies and excuses? Are they crisis managers — the people who fix things when they break? Or are they symbolic org-chart sacrificial lambs? Sadly, they are not active or effective participants in the public debate about privacy today, any more than they were when I wrote that column on privacy at the end of 2006. I have heard CPOs at publicly traded companies proclaim success because "We are not currently being sued" or "There are no investigations underway at the present moment." Not being sued is laudable, but it doesn't qualify as an achievement.

In an economy driven by information and its use, doesn't it make sense to have a map depicting what we know about the customers, what the customers know we know about them, what we would like to know about the customers and what the customers would like us to know — or would let us know — about them? That map would be a good place to start. ♦

Thornton A. May

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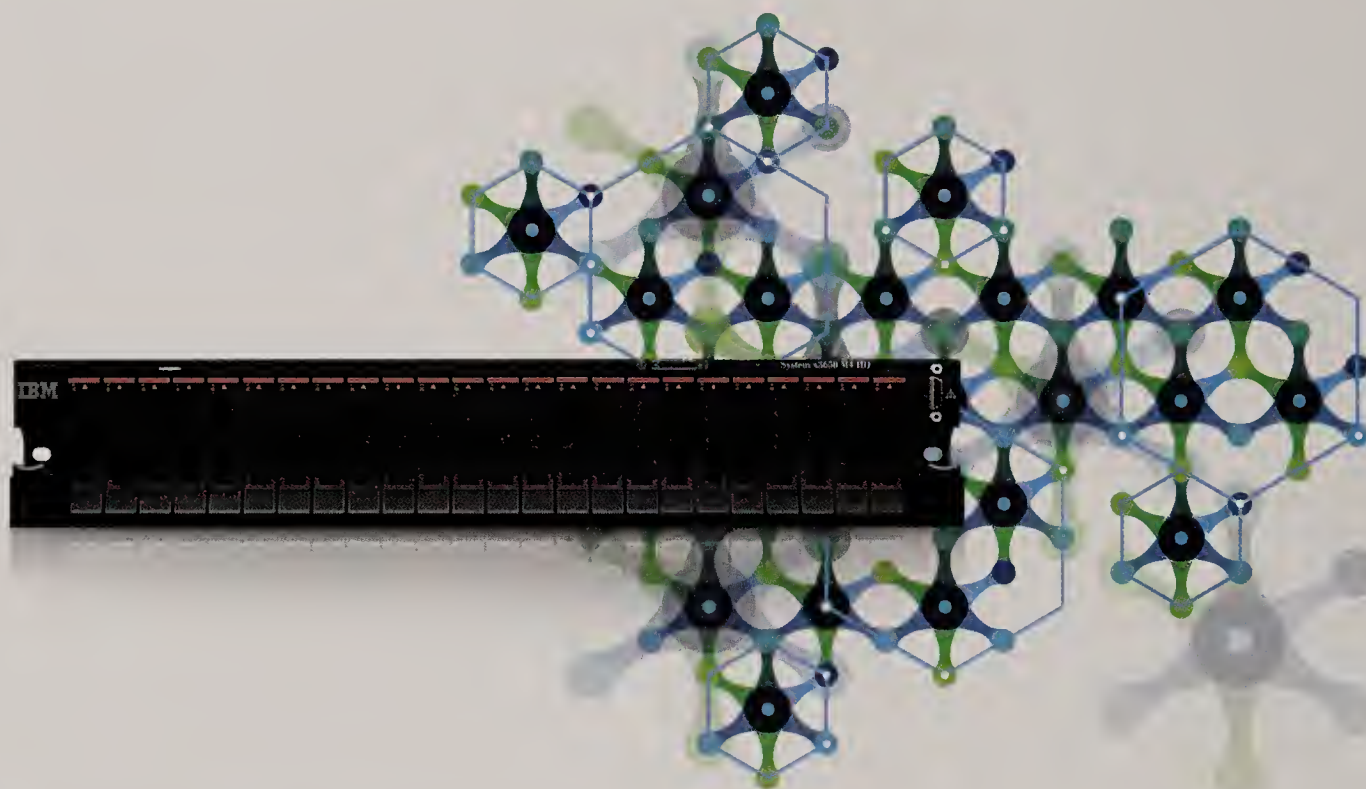
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